## <u>CLAIMS</u>

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- 2 What is claimed is:
- 3 1. An exclusion controller which allows an information processing
- 4 unit to acquire a contended resource to the exclusion of other
- 5 information processing units, the exclusion controller comprising:
- a plurality of non-prioritized information processing units
- 7 mutually exclusively acquiring a non-prioritized exclusion right by
- 8 a first process, the non-prioritized exclusion right indicating a
- 9 candidate for acquiring the contended resource; and
- a prioritized information processing unit acquiring the
- 11 contended resource by a second process to the exclusion of the
- 12 non-prioritized information processing unit having acquired the
- 13 non-prioritized exclusion right, the second process requiring a
- 14 shorter processing time than the first process.
- 15 2. The exclusion controller according to claim 1, further
- 16 comprising:
- a prioritized exclusion right storage area for storing
- 18 prioritized exclusion right information indicating that the
- 19 prioritized information processing unit is trying to acquire the
- 20 contended resource; and

- a non-prioritized exclusion right storage area for storing
- 2 non-prioritized exclusion right information indicating which of the
- 3 plurality of non-prioritized information processing units has
- 4 acquired the non-prioritized exclusion right,
- 5 wherein each non-prioritized information processing unit
- 6 executes, as the first process, a process for storing the
- 7 non-prioritized exclusion right information indicating that the
- 8 non-prioritized information processing unit has acquired the
- 9 non-prioritized exclusion right, to the exclusion of the other
- 10 non-prioritized information processing units if the non-prioritized
- 11 exclusion right information has not yet stored, and
- the prioritized information processing unit executes, as the
- second process, a process for storing the prioritized exclusion
- 14 right information and then reading the non-prioritized exclusion
- 15 right storage area, and acquires the contended resource if the
- 16 non-prioritized exclusion right information is not stored, but does
- 17 not acquire the contended resource if the non-prioritized exclusion
- 18 right information has already stored.
- 19 3. The exclusion controller according to claim 2, further
- 20 comprising:
- 21 an area usage type storage area for storing information

- 1 indicating which of the non-prioritized exclusion right information
- 2 or prioritized information processing unit information the
- 3 non-prioritized exclusion right storage area stores,
- 4 wherein the non-prioritized exclusion right storage area
- 5 stores any one of the non-prioritized exclusion right information
- 6 and the prioritized information processing unit information
- 7 indicating which of the plurality of information processing units is
- 8 the prioritized information processing unit, and
- each of the prioritized information processing unit and the
- 10 plurality of non-prioritized information processing units acquires
- 11 the non-prioritized exclusion right by the first process if the
- 12 non-prioritized exclusion right storage area stores the
- 13 non-prioritized exclusion right information, and the information
- 14 processing unit acquires the contended resource if the information
- 15 processing unit has acquired the non-prioritized exclusion right.
- 16 4. The exclusion controller according to claim 2, further comprising
- 17 a prioritized information processing unit change unit for changing
- 18 the prioritized information processing unit into a non-prioritized
- information processing unit if non-prioritized exclusion right
- 20 information has been already stored, in the second process.

- 1 5. The exclusion controller according to claim 2, further
- 2 comprising:
- an acquisition check unit for checking whether the acquisition
- 4 of the contended resource by any one of the first and second
- 5 processes has failed; and
- a monitor control unit for executing exclusion control by a
- 7 monitor mode in which all the information processing units waiting
- 8 to acquire the contended resource are previously recorded and the
- 9 information processing unit having released the contended resource
- 10 notifies the information processing units waiting to acquire the
- 11 contended resource that the contended resource has been released, if
- 12 a check has been made that the acquisition of the contended resource
- 13 has failed.
- 14 6. The exclusion controller according to claim 1, further
- 15 comprising:
- a prioritized information processing unit information storage
- area for storing prioritized information processing unit information
- 18 indicating which of the information processing units is the
- 19 prioritized information processing unit; and
- a prioritized information processing unit setting unit for
- 21 allowing any one of the plurality of information processing units to

- 1 execute a process for storing, in the prioritized information
- 2 processing unit information storage area, the prioritized
- 3 information processing unit information indicating that the
- 4 information processing unit is the prioritized information
- 5 processing unit, to the exclusion of the other information
- 6 processing units if the prioritized information processing unit
- 7 information has not been stored.
- 8 7. The exclusion controller according to claim 1, further comprising
- 9 a prioritized information processing unit setting unit for setting
- 10 the information processing unit having first acquired the contended
- 11 resource as the prioritized information processing unit and for
- 12 setting the other information processing units except the
- prioritized information processing unit as the non-prioritized
- information processing units.
- 15 8. The exclusion controller according to claim 1, further comprising
- 16 a prioritized information processing unit change unit for changing
- any one of the non-prioritized information processing units into the
- 18 prioritized information processing unit.
- 19 9. The exclusion controller according to claim 8, further

- 1 comprising:
- a full stop unit for stopping all of the plurality of
- 3 information processing units,
- 4 wherein the prioritized information processing unit change
- 5 unit changes the non-prioritized information processing unit having
- 6 acquired the contended resource at the time when all of the
- 7 plurality of information processing units are stopped, into the
- 8 prioritized information processing unit.
- 9 10. The exclusion controller according to claim 1, further
- 10 comprising:
- a resource information storage area for storing resource
- information indicating whether the contended resource has been
- acquired by any one of the plurality of information processing
- units, while associating the resource information with priority
- 15 right information indicating that the prioritized information
- 16 processing unit exists,
- wherein the prioritized information processing unit executes,
- 18 as the second process, a process for reading information from the
- 19 resource information storage area and for writing the resource
- 20 information in the resource information storage area if the priority
- 21 right information is stored, and

- 1 wherein each non-prioritized information processing unit
- 2 comprises:
- a prioritized information processing unit stop unit for
- 4 stopping the prioritized information processing unit;
- 5 a priority right removal unit for removing the priority right
- 6 information from the resource information storage area by the first
- 7 process exclusively from the other information processing units
- 8 after the prioritized information processing unit stop unit has
- 9 stopped the prioritized information processing unit;
- a transient state check unit for checking whether the stopped
- 11 prioritized information processing unit is executing the second
- 12 process; and
- an execution state setting unit for setting an execution state
- of the prioritized information processing unit to a state in which
- 15 the prioritized information processing unit is not acquiring the
- 16 contended resource by the second process, if a check has been made
- that the prioritized information processing unit is executing the
- 18 second process.
- 19 11. The exclusion controller according to claim 10, wherein the
- 20 execution state setting unit sets the execution state by setting
- 21 execution location information indicating an execution location of a

- 1 program realizing the prioritized information processing unit to be
- 2 in a state before the resource information storage area is read.
- 3 12. The exclusion controller according to claim 10, wherein the
- 4 execution state setting unit invalidates a process for writing in
- 5 the resource information storage area in the second process.
- 6 13. The exclusion controller according to claim 10, further
- 7 comprising a monitor control unit for executing exclusion control by
- 8 a monitor mode in which all the information processing units waiting
- 9 to acquire the contended resource are previously recorded and the
- information processing unit having released the contended resource
- 11 notifies the information processing units waiting to acquire the
- 12 contended resource that the contended resource has been released, if
- information indicating that the prioritized information processing
- 14 unit does not exist has been stored in the resource information
- 15 storage area.
- 16 14. An exclusion controller which allows any one of a plurality of
- 17 threads capable of acquiring an identical contended resource to
- 18 acquire the contended resource to the exclusion of the other threads
- 19 different from the relevant thread, the exclusion controller

- 1 comprising:
- 2 an execution state acquisition/notification unit for acquiring
- 3 execution location information indicating an execution location of a
- 4 program in a first thread of the threads and for notifying a second
- 5 thread different from the first thread of the execution location
- 6 information; and
- 7 an execution state setting unit for allowing the second thread
- 8 to execute a process for setting, in the first thread, execution
- 9 location information indicating that the contended resource is not
- 10 being acquired, if the acquired execution location information
- indicates that the contended resource is being acquired.
- 12 15. An exclusion control method for allowing an information
- processing unit to acquire a contended resource to the exclusion of
- 14 other information processing units, the exclusion control method
- 15 comprising:
- a plurality of non-prioritized information processing modules
- 17 for mutually exclusively acquiring a non-prioritized exclusion right
- 18 by a first process, the non-prioritized exclusion right indicating a
- 19 candidate for acquiring the contended resource; and
- a prioritized information processing module for acquiring the
- 21 contended resource by a second process to the exclusion of the

- 1 non-prioritized information processing unit having acquired the
- 2 non-prioritized exclusion right, the second process requiring a
- 3 shorter processing time than the first process.
- 4 16. An exclusion control method for allowing any one of a plurality
- of threads capable of acquiring an identical contended resource to
- 6 acquire the contended resource to the exclusion of the other threads
- 7 different from the relevant thread, the exclusion control method
- 8 comprising:
- 9 an execution state acquisition/notification module for
- 10 acquiring execution location information indicating an execution
- 11 location of a program in a first thread of the threads and for
- 12 notifying a second thread different from the first thread of the
- 13 execution location information; and
- an execution state setting module for allowing the second
- 15 thread to execute a process for setting, in the first thread,
- 16 execution location information indicating that the contended
- 17 resource is not acquired, if the acquired execution location
- information indicates that the contended resource is acquired.
- 19 17. A program for causing a computer to function as an exclusion
- 20 controller which allows an information processing unit to acquire a

- 1 contended resource to the exclusion of other information processing
- 2 units, the program causing the computer to effect the functions of
- 3 claim 1.
- 4 18. A program for causing a computer to function as an exclusion
- 5 controller which allows any one of a plurality of threads capable of
- 6 acquiring an identical contended resource to acquire the contended
- 7 resource to the exclusion of the other threads different from the
- 8 relevant thread, the program causing the computer to effect the
- 9 functions of claim 14.
- 10 19. A recording medium having a program recorded thereon, the
- 11 program causing a computer to function as an exclusion controller
- which allows an information processing unit to acquire a contended
- resource to the exclusion of other information processing units,
- wherein the program causes the computer to function as:
- a plurality of non-prioritized information processing units
- 16 mutually exclusively acquiring a non-prioritized exclusion right by
- a first process, the non-prioritized exclusion right indicating a
- 18 candidate for acquiring the contended resource; and
- a prioritized information processing unit acquiring the
- 20 contended resource by a second process to the exclusion of the

- 1 non-prioritized information processing unit having acquired the
- 2 non-prioritized exclusion right, the second process requiring a
- 3 shorter processing time than the first process.
- 4 20. A recording medium having a program recorded thereon, the
- 5 program causing a computer to function as an exclusion controller
- 6 which allows any one of a plurality of threads capable of acquiring
- 7 an identical contended resource to acquire the contended resource to
- 8 the exclusion of the other threads different from the relevant
- 9 thread, wherein the program causes the computer to function as:
- an execution state acquisition/notification unit for acquiring
- 11 execution location information indicating an execution location of a
- 12 program in a first thread of the threads and for notifying a second
- 13 thread different from the first thread of the execution location
- 14 information; and
- an execution state setting unit for allowing the second thread
- 16 to execute a process for setting, in the first thread, execution
- 17 location information indicating that the contended resource is not
- 18 being acquired, if the acquired execution location information
- indicates that the contended resource is being acquired.
- 20 21. A computer program product comprising a computer usable medium

- 1 having computer readable program code means embodied therein for
- 2 causing exclusion control, the computer readable program code means
- 3 in said computer program product comprising computer readable
- 4 program code means for causing a computer to effect the functions of
- 5 claim 1.
- 6 22. A computer program product comprising a computer usable medium
- 7 having computer readable program code means embodied therein for
- 8 causing exclusion control, the computer readable program code means
- 9 in said computer program product comprising computer readable
- 10 program code means for causing a computer to effect the functions of
- 11 claim 14.
- 12 23. An article of manufacture comprising a computer usable medium
- 13 having computer readable program code means embodied therein for
- 14 causing exclusion control, the computer readable program code means
- in said article of manufacture comprising computer readable program
- 16 code means for causing a computer to effect the steps of claim 15.
- 17 24. A program storage device readable by machine, tangibly embodying
- a program of instructions executable by the machine to perform
- 19 method steps for exclusion control, said method steps comprising the

- 1 steps of claim 15.
- 2 25. An article of manufacture comprising a computer usable medium
- 3 having computer readable program code means embodied therein for
- 4 causing exclusion control, the computer readable program code means
- 5 in said article of manufacture comprising computer readable program
- 6 code means for causing a computer to effect the steps of claim 16.
- 7 26. A program storage device readable by machine, tangibly embodying
- 8 a program of instructions executable by the machine to perform
- 9 method steps for exclusion control, said method steps comprising the
- 10 steps of claim 16.